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## Circular Pedagogy for Smart, Inclusive and Sustainable Education

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### Abstract

Higher education institutions seem to be engaged in a reactive process when thinking about education for sustainable development, instead of being proactive. At every stage, educational models remain very limited to specific goals and agendas driven by the fad of the moment and without articulating a sustainable educational model that we argue should be uttered within the concepts of intercultural competencies, smart, inclusive, and sustainable education where learners engage on a circular learning process as captured by the circular pedagogy for higher education. If the academic community is serious about driving actions that help us to enact change and impact to develop a more sustainable conscious socio-economic and environmental global society, we need to rethink our education models and pedagogies so that they are attuned with the complexity of our evolving reality.

**Keywords:** Circular Pedagogy, Education, Smart, Technology, Innovation, Sustainable Education, Intercultural Competences

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## 1 Introduction

The European Education Area (EEA) provides a strategic framework that fosters quality education and training for all by encouraging and promoting collaboration between the European Union Member States (EEA, 2022). Furthermore, Article 3 of the Treaty on the European Union (EU) declares that the Union promotes peace, its values, and the well-being of its people. The Treaty emphasises the importance of promoting economic, social, and territorial cohesion by respecting the Union's rich cultural and linguistic diversity along with ensuring that Europe's cultural heritage is safeguarded and enhanced (EUR-Lex, 2012). To better understand our European legacy and the challenges associated with sustainable education within the European University of Technology (EUT+) context, we need to consider how our educational systems and models work and how they are affected and defined by multiculturalism and diversity. According to the European Commission (2022), the term multiculturalism was first used in 1957 to describe the case of Switzerland as a multicultural country defined by the co-existence of multiple languages. However, the term came into common currency in Canada in the late 1960s and quickly spread to other English-speaking countries. The 1960s witnessed the introduction of a wide range of policies that attempted to provide a context between ethnocultural minorities and their relationship with the state by adopting new policies, laws and practices seeking to reflect the distinctive needs, identities, practices, and aspirations of minorities (Banting and Kymlicka, 2012; Kymlicka, 2010). Multiculturalism emphasises cultural differences, and distinct cultures existing next to each other without necessarily much contact or participative interaction. Our engagement with the extant literature has revealed that major European leaders have publicly stated that multiculturalism in their countries has failed (Mikelatou and Arvanitis, 2019; Mor Barack, 2013; Banting and Kymlicka, 2012; Kymlicka, 2010). Research findings that are not surprising, as the model of multiculturalism have often been criticised on different grounds. For example, some of the major critics surrounding the term relate to the complexities of how distinct ethnic cultures can be maintained within a state. Furthermore, researchers have raised concerns regarding the failure of policies of multiculturalism to create inclusion, that has resulted in societies that are more divided, segregated, and prone to conflict (Elias et al., 2021; Ballantyne and Malhi, 2017; Malik, 2015; Mor Barack, 2013). The significance of developing and integrating intercultural competencies as part of higher education models within the European context is undeniable, as we live in a diverse society that is failing to be inclusive jeopardising our future for living on stable societies and are opportunities to keep growing and progressing in a sustainable and cohesive manner. Consequently, in this paper, we propose the analysis and the development of an educational framework that integrates circular pedagogy, smart and inclusive education, and sustainable development to support Higher Education Institutions (HEIs) in their transition towards educational models that align with the UN 2030 Agenda and the outlined 17 SDGs and its 169 targets (UN, 2015). The UNESCO Intercultural Competences and Conceptual and Operational framework (2013) underlines the challenges associated with globalisation as a range of cultures are now in closer contact, putting significant pressure on existing educational systems and models. Cultural boundaries are now ever-changing and increasing levels of complexity are consequential from the fast pace of social transformation driven by innovation and technology and where smart education could play a significant role in driving needed educational changes. As a result, understanding and acknowledging the importance of



learning environments that are flexible, adaptable, and cognisant of our cultural diversity and intercultural contact are critical aspects of our contemporary society and of paramount importance in defining and consolidating the EUT+ vision for equity, diverse and inclusive education. Our educators need to be aware of the importance of integrating intercultural competencies as part of the curriculum design due to their significance in driving participation, inclusion, integration, sustainable development and harmonious co-existence as we accommodate learners' differences (UNESCO, 2013, p.7). Furthermore, intercultural competence is a term frequently used in diversity, inclusion, and cultural training settings. However, still, the field is characterised by a lack of consensus on a single definition that is agreeable to everyone. Within the EU, intercultural competencies are understood as the skills and capacities that allow us to interact across cultures openly and effectively. Therefore, educators should be able to facilitate constructive learning and research environments that foster interactions between individuals from different countries. It is vital to consider the benefits and challenges associated with diverse learning spaces defined by varied ethnic backgrounds, gender, sexual orientation, race, and social and cultural upbringings to enable an inclusive and positive learning experience at the time that we nurture and facilitate social integration. Educational ecosystems must respond to the need to integrate marginalised groups like minorities, religious groups, economically deprived individuals or any other collective/s that are underrepresented and prone to discrimination, side-lining and social exclusion (RF CDC, 2018, p.32). Therefore, intercultural competencies emerge as essential to support and strengthen democratic systems and facilitate accessible and integrated education across the Union. Education is critical to protect the Union's diversity and preserve its cultural heritage and values.

Currently, we are facing significant challenges because of the Russian war, where European values are being confronted by the instability of the global economic and political landscape characterised by rising levels of convolutedness, conflict, and uncertainty. Therefore, educational systems and higher education institutions emerge as critical players in driving change that seeks to promote societies that cherish stability, harmonious co-existence, and peace. As a result, educational models need to offer additional skills to adult learners as they cannot be limited to developing discipline-specific skills that are not sufficient to navigate the challenges of modern-day and future needs and demands of our European society.

As part of the adult learning process, there is a need to nurture inclusivity, respect for identities and cultural values by acknowledging and becoming cognisant of the different needs and supports required by societies to ensure that we are educating adults so that they can embrace the future challenges associated with their global citizenship. The EEA highlights the importance of working together to build more resilient and inclusive education and training systems as education is identified as the foundation of personal fulfilment, employability, and active and responsible citizenship. Furthermore, the European Strategic Framework highlights the importance of education as part of building European societies and creating vital communities and economies where individuals benefit from high-quality and inclusive education. Access to quality education and continuous training aiming to upskill and reskill individuals through their lifelong learning journey is viewed as a right for all citizens, as captured within the European Pillar of Social Rights. The European Pillar of Social Rights is supported by twenty principles that are considered the beacon to guide

Europe towards a more fair, inclusive, and full of opportunities society, with education being identified as a dominant axis.

This research paper seeks to offer insights on the importance of European HEIs to promote lifelong learning environments that align with the aims of the Union that are inter alia to promote the well-being of its people, and work for the sustainable development of Europe. European economic and social stability can benefit from the development of smart and inclusive education, supported by technology, innovation, to help promote an educational model for sustainable development and stability, which are critical aspects discussed in the following sections.

## 2 Intercultural Competences and Inclusive Education

The Warsaw Declaration and Action plan of the heads of state and government of the Council of Europe of 2005, as well as the Wrocław Declaration of 50 years of European Cultural Cooperation, have already underlined the crucial importance of intercultural dialogue, exchange, and education amongst and for Europeans in order to build a common European future based on the values and principles the Council of Europe stands for and promote (Brotto et al., 2012). Intercultural understanding and intercultural competencies are critical as they enable us to understand differences across Europe and the root causes of some crucial issues affecting our global society, due to differences across cultural, socio-cultural, ethnic, gender and race diversity and any other socio-economic lines that quite often lead to discrimination, racism, hate speech and any other form of marginalisation and exclusion. Unfortunately, learning environments are not isolated from cultural misunderstandings and from failing to integrate learners from different cultural backgrounds highlighting the urgent need to rethink curriculum designs and mainstream curricula as intercultural competencies should be considered a key element of mainstream education. Learning environments are closely connected to the concept of multiculturalism, as we need to be ready to live and work together in a heterogeneous world (Council of Europe, 2012). Therefore, there is a real urgency to engage in a transformation process in global education and learning environments to bring skills and competencies that help us to live and work together in our diverse societies and that contribute to diminish social conflict and confrontation within European societies. It is critical that we understand that multiculturalism is not only about celebrating the positive elements of each culture, but we also need to understand most common problems like unemployment, poor educational outcomes, residential segregation, poor language skills, among many others that can create economic and political clashes and exacerbate situations of conflict that lead to confrontation (Kymlicka, 2010; 2012). As a concept, multiculturalism has emerged over the past thirty years, mainly due to the high influx of immigrants and refugees particularly toward the West, due to globalisation and, more recently, due to armed conflicts in the Middle East (Mikelatou and Arvanitis, 2019). Climate change, the emergence of new conflicts and wars in combination with the enhancement of economic inequalities will lead towards further pressures on the migratory crises and to the advent of further challenges on our educational systems that need to be proactive so that we can offer an adequate and effective response to the needs of our global society.

Multiculturalism has been used as an umbrella term to describe diverse concepts, and thus its meaning can change in accordance with the context. It can refer to the demographic

structure of a society, the notion of cultural diversity, the policy of managing immigration, a pedagogical concept, an ideology, or even a management style (Gingrich 2003). Smart and inclusive education requires significant levels of participation within the learning ecosystem and technology can play a significant role. Through collaboration, participation, and active engagement in diverse learning environments, it would be possible to build more resilient and inclusive learning, training, and research systems (Dunn and Inglis, 2010). We argue, that critical elements of the learning process are linked to circular pedagogy and the interchangeable nature of the learning, teaching and research elements. As such, there is a need to foster participation, social interaction, and engagement, where teachers must be able to assess their students learning needs so that they can design curriculums and learning environments that minimises potential barriers to learning. A learning ecosystem guided by the circular pedagogy needs to go beyond giving access to students to content as this is insufficient to address students' specific needs and to support them through their potential learning challenges. Learning environments need to be supported by the principles that guide Universal Design for Learning (UDL) to enable access and inclusivity. In parallel, educators need to reflect on the need for Differentiated Instruction (DI) and its importance as neglecting learners needs, and challenges will not suffice the purpose of adult education. We need to acknowledge that designing the curricula should be considered in a context that enables all individuals to gain knowledge, skills and become active members.

The concept of a circular pedagogy for higher education argues that the learning space is defined by learning, teaching, and research activities where learners take interchangeable roles simultaneously. Therefore, if the learning space is affected by barriers that prevent or undermine students' ability to participate and collaborate as they navigate the circular learning process the educational model will fail to provide the required support. There is a fundamental need to enable collaboration, integration, and a sense of belonging that nurture and fosters active engagement. Learning environments require the promotion of an inclusive culture where students are accepted and recognised for who they are and where they are able to interact within a multicultural learning and research environment. We argue that technology can be used as a conduit for inclusive education to provide assistance to students so that they can interact and become active learners and embrace intercultural competencies as part of their learning and development process. Therefore, when technology is considered from its assistive perspective, it is important to consider in which way it can help teachers to design learning environments that are in alignment with the principles of Universal Design for Learning (UDL) to ensure that all students have access to education and that inclusivity is nurtured and fostered throughout the whole learning and research process (Turnball et al., 2002).

The literature provides some interesting insights indicating that the benefits of cultural enrichment are often overstated. At the same time, the accompanying social problems are often overlooked. As a result, we are facing a significant failure in designing and implementing policies that promote inclusive societies. The EU is confronted with the unique challenge of accommodating its Member States' cultural identities and those of the numerous minority groups of immigrants residing in its territory. In an attempt to address this issue, the EU has been promoting intercultural awareness through initiatives that facilitate interaction between different cultures and the people that embody them to forge a bond and common understanding. The role of HEIs in the European context needs to reflect and

reassess their educational models and their vision for diverse and inclusive education that we argue will contribute to the development of educational policies that seek to address existing failures regarding multiculturalism and inclusive societies and learning environments.

### 3 Smart Education

#### 3.1 Conceptual delimitation

In the context of the technological explosion characteristic of the contemporary world, the "smart education" concept highlights the process of learning through technology. The concept of smart education appeared recently in scientific literature as a result of technological advances. Its importance is being realised in the context of the major barriers that all education systems have had to face during the pandemic period. A meta-analysis carried out in 2021, revealed the fact that, although this concept enjoys increasing attention, the number of publications is very small compared to the importance of the concept (Martín, Alario-Hoyos & Kloos, 2019). The relevance of the concept is being supported by the recent advance of information technologies, but also by global challenges for which global education systems must identify sustainable solutions through new approaches to teaching practices and learning context (Shoikova, Nikolov, & Kovatcheva, 2017; Zhu, Sun, & Riezebos, 2016a; Zhu, Yu, & Riezebos, 2016b).

Concepts such as cloud technologies, mobile learning, Internet of Things (IoT), augmented or virtual reality in the context of concepts such as artificial intelligence, deep learning, and big data alongside with new ways of learning such as: distant learning, mobile learning (m-learning), personalised learning, flipped and blended learning, social collaborative learning, and game-based learning, among many others require a reconsideration of what involves the entire educational process and related practices (OECD, 2016; Erkollar & Oberer, 2016; Güzer & Caner, 2014; Rakow, 2007; Strayer, 2012). Moreover, new information technologies are forcing the transition from traditional education to smart education through directions which are in the early research phases (Demir, 2021; Bajaj & Sharma, 2018, Shoikova, Nikolov, & Kovatcheva, 2017; Zhu et al., 2016b). On the other hand, the reviewed literature suggest that most publications relate to the analysis of the concept of smart education centred on two main approaches: 1. Smart education designs and 2. Smart education projects based (Demir, 2021). Regardless of the conceptual approaches of smart education, "the goal of smart education is to foster a workforce that masters 21st century knowledge and skills to meet the needs and challenges of society (Zhu at all, 2016b)".

#### 3.2 Defining smart education

Because, in many cases, traditional teaching-learning-evaluation practices are encouraged under the umbrella of the use of technological items, the definition of the concept of smart education is complex. Although there are several approaches to defining the concept, it remains *a work in progress* given its emergence state. If in 2012 the concept of smart education was formulated in terms of "the essence of smarter education is to create intelligent environments by using smart technologies, so that smart pedagogies can be facilitated as to provide personalised learning services and empower learners to develop talents of wisdom that have better value orientation, higher thinking quality, and stronger



conduct ability" (Zhu & He 2012). In 2016, smart education was defined as "the concept of learning in the digital age (Zhu & all, 2016b; Shoikova, Nikolov, & Kovatcheva, 2017)". Other sources define smart education as "providing personalised learning, anywhere and anytime. Smart education is about taking learning outside the traditional classrooms; and is an activity that can be done anywhere and anytime" (Bajaj & Sharma, 2018). Researchers also argue that smart education is understood in terms of smart learning environments that "represent a new wave of educational systems, involving an effective and efficient interplay of pedagogy, technology and their fusion towards the betterment of learning processes" (Shoikova et al., 2017). According to the International Association of Smart Learning Environments, "a smart learning environment can be considered "smart when it makes use of adaptive technologies or when it is designed to include innovative features and capabilities that improve understanding and performance. Smart education also offers new opportunities for providing personalised education and training to people with disabilities (El Janati et al., 2018). According to other authors, smart education represents "an educational system that allows students to learn by using up-to-date technology and it enables students to study with various materials based on their aptitudes and intellectual levels (Jang, 2014)" or "effective and coherent use of information and communication technologies to reach a learning outcome using a suitable pedagogical approach (Demir, 2021)".

The analysis of the different elements presented in the definitions above, it can be noted that the new concept of smart education has three basic elements: *new technologies, new approaches to learning*, which imply *new approaches to teaching practices*. Based on these three main elements, in this paper, *smart education is not only about using new informational technology but enables regaining consciousness of the humanistic dimension of education in a holistic sense, paying attention to the learners needs*. We must not omit the fact that education, traditional or smart, is mainly carried out by people, therefore another relevant and essential concept that stands out is "*smart educator*". We cannot make the transition from a traditional approach to education to a smart approach, without turning our attention to the people who will facilitate this transition. As a result, we argue that in order to promote "*smart education*" we need "*smart educators*" and a *smart educator, in our view is a researcher, teacher and student who assumes each of these roles in the proposed education model, someone who can switch roles between student, teacher and researcher – as all will navigate the learning continuum between these roles through their lifelong learning process and education as we have discussed on our proposed Circular Pedagogy for Higher Education* (Morales et al., 2022). Thus, all at the University are equally engaged and eager to reach a deeper understanding of both higher order questions and new insights for better futures. Even if we take into account relevant elements already existing in scientific literature (Zeeshan et al., 2022; Demir, 2021; Zhu et al., 2016b), all elements must be considered from a transdisciplinary perspective (Nicolescu, 2010) to enable an understanding of the complex reality that defines education for sustainable development and the significance of articulating educational models within the precepts outlined by our novel circular pedagogy that is guided by the integration of intercultural competences as part of the lifelong learning process.

### 3.2.2 Smart and Inclusive Education in the Context of Multiculturalism

The concept of education includes a relatively new concept that has consolidated in a short time both at the level of research in the sphere of education and at the level of practice and global policy. According to the specialized literature, education includes



objective circumstances in education as well as methodology. In this frame of reference, the aim is both to identify the barriers in education and to remove them as much as possible, to have access, be present and actively participate in the achievement of learning objectives. This direction of action is dedicated to the Educational for All (EFA) movement that was initiated at the World Conference on Education for All in 1990 organized by UNESCO, UNDP, UNFPA, UNICEF, and the World Bank, and a global commitment to ensuring quality education for children, youth and adults (UNESCO, 2016). This commitment was reconfirmed 10 years later at the meeting in Dakar, Senegal, and is now found as a goal for sustainable development specified in the 2030 Agenda (UN, 2015) and elaborated in the Incheon Declaration on Implementation SDG4 (UNESCO, 2016).

Therefore, inclusive education has established itself worldwide within the specialized literature as a global field of educational research, a basic element in the initial training of teachers and the continuous professional training of all teaching staff, but also as an area of development of educational policies and actual practices. Also, inclusive education is a constant of UNESCO's activity it started in 1990 in Jontiem, Thailand, and it consolidated later through the conferences in Amman, Jordan (1996), Dakar, Senegal (2000); Geneva, Switzerland (2008), and last but not least, the most important moment, Incheon, South Korea (2015) where a framework of action was established to achieve inclusive education globally with the support of global monitoring reports of education (global education monitoring GEM). As a result, based on the reports up to 2015, it was concluded the rigor of the change of perspectives in education and the investment on a sustained and general effort toward what entails and implies an inclusive and equitable perspective of education at all levels of learning and throughout life for all persons. This is in the context in which, globally, in 2014, the following reports existed: 57 million children and 69 million teenagers still did not have access to primary, basic education; 774 million adults were illiterate in 2011, two-thirds of whom were women. At least 250 million children cannot read, write or do simple calculations even after completing primary school. Persistent inequalities in access, participation and learning outcomes for vulnerable groups and minorities; 60% of countries have achieved gender parity at primary level and 38% at the secondary level; Inadequacy of education funding; Increase in violent attacks on students in schools (Roger, 2018). Furthermore, the data reported that by 2020 although progress was being made, there are still many challenges to overcome to achieve the SDG4 objective (UNESCO, 2020).

In this frame of reference, inclusive education represents the response of communities to failure, and/or educational failure is seen as a lack of learning opportunities caused by different variables such as cultural, geographic, economic, and health aspects, among others. Therefore, in order to be sustainable, inclusive education must create learning spaces in which all aspects related to exclusion are specified both at the structural level and at the mental level. This is because, in essence, inclusive education should provide a principled and systematic approach to identifying and removing barriers for all vulnerable groups (Roger, 2018). Furthermore, the OECD puts the concept of equity at the forefront of education, defining it as the access, participation, and progress of all in relation to educational goals, regardless of individual particularities or social circumstances (OECD, 2021). As a result, by analyzing the specialized literature and by paying close attention to recent data, one can observe the joining of the two reference concepts in education: inclusion and equity (UNESCO, 2017). In this vision, the highlighted motto is "every student matter and matter equally", a central and simple message at first glance. However, things get overcomplicated when trying to put the direction of action into practice. This is because the transfer from the ideological level to the actual applicability in particular contexts calls for



a paradigm shift, calls for a change in the mentality we have, in the way we think, and, of course, in actual practice at all levels of reference: from to classrooms and teachers, as well as other professionals involved in education and up to people responsible for developing national policies (UNESCO, 2017).

Within the outlined context, it is relevant to mention that national policies can influence and support inclusive attitudes and practice through direct measures regarding teaching methods, support, resources, and alternatives, all of which represent the foundations of inclusive education (UNESCO, 2020). Consequently, the design of policies with an inclusive vision emerges from the awareness of the fact that learning difficulties are manifested against the background of shortcomings at the level of the education system, such as: how the educational process is organized, the way of teaching, the learning environment, how learner progress is monitored and assessed. More than that, and perhaps much more important, is the change in perspective and perception of the differences between people. This implies the awareness that differences between individuals are the norm and not the exception, and these differences should be seen not as problems to be solved but as opportunities to democratize education and enrich the dimensions of learning. In this view, differences can represent a catalyst in innovation that all learners can benefit from regardless of particularities (UNESCO, 2017). Therefore, as a working definition to support this research paper we consider the meaning of inclusive education as: "ensuring and guaranteeing the right of access of all children, attendance, participation, and success in the local regular school. *Inclusive education calls on educational institutions to develop their capacity to remove barriers to access, attendance, participation, and performance in order to provide excellent educational experiences and outcomes for all children and youth* (Roger, 2018)". Our working definition is not restrictive and needs to integrate adult education, being this a critical aspect of our vision for European education and being this a central tenet to guide the work at the EUT+.

### 3.2.3 The Process of Inclusive Education

According to UNESCO, inclusive education represents a process oriented toward removing barriers to access, presence, and participation of students in learning, and equity represents the continuous concern to provide a correct, appropriate and compliant education with the particularities of the students. In this framework, inclusive education represents a process of strengthening the system's capacity to respond to the particularities of all learners in the way that each one can achieve their best potential (UNESCO, 2017). Based on these understandings, inclusive education is both a process and a goal because it represents a constant action to ensure authentic learning and participation for all learners. In both cases, continuous change is needed in parallel to a serious commitment to educational transformation. In line with Booth & Ainscow (2002) early research inclusive education involves,

- Valuing all learners and teachers equally.
- Increasing learner participation and reducing exclusion from cultural contexts, curriculum, communities, or educational units.
- Restructuring policies, culture, and practices in schools so that they respond to the diversity of learners in their particular contexts.
- Reducing barriers to learning and participation for all learners, not just those with special educational needs.

- Designing strategies to remove barriers to access and participation that, although perhaps intended for a single learner, help facilitate learning for other students as well.
- Referring to student differences as a development opportunity to identify optimal ways to support learning and not as a problem to be solved.
- Awareness of the right to education for all learners in close environments.
- Improving schools for both teachers and students.
- Awareness of the role of schools in building communities and reference values as well as their impact on school success.
- Encouraging sustainable partnerships between learning institution and local communities
- Admitting that inclusion in schools is the first step toward inclusion in society.

Therefore, inclusiveness represents the process in which learning institution units develop strategies by which they support both teachers and students in an open and flexible way that facilitates the building of local communities that allow the manifestation of the optimal potential for each learner, regardless of particularities or contexts of reference which imply multiple cultural values and identities as well.

### 3.3. Smart, Inclusive and Sustainable Education

In light of *inclusive and sustainable education*, the concept of *smart education* highlights the relevance of the meaning of the word *smart* regarding the education process. When we talk about education, "*smart*" means personalised, intelligent, and adapted. On the other hand, if we focus on learners, "*smart*" refers to wisdom and intelligence. Confucius, the most famous educator of China, believed that wisdom can be achieved by three methods: reflection (the noblest), imitation (the easiest) and experience (the bitterest). In this view, wisdom is defined as "*the ability to use your knowledge and experience to make good decisions and judgments (Zhu at all, 2016b)*". Along with wisdom, intelligence is "*the ability to solve problems that are valuable in one or more cultural settings (Gardner 2011, apud Zhu et al., 2016b)*." In the context of technology, *smart* refers to "*efficiency and effectiveness or to the smart device much smaller, more portable and affordable.*" For education environments '*smart*' means *engaging, intelligent and scalable, tailored and a personalised learning service*" (Zhu et al., 2016b). Within the context of our envisioned educational model framed around the novel concept of circular pedagogy, we understand "smart" as intelligence, wisdom, efficiency, and effectiveness. In this regard, smart education refers to a medium of learning which enables learners to think intelligently, act efficiently, and solve problems effectively that we connect to the circularity of the learning process and the development of critical competences and skills that enable critical thinking and questioning.

In the framework of sustainable development formulated in terms of "*the needs of the present without compromising the ability of future generations to meet their own needs (United Nations World Commission on Environment and Development, 1987)*", smart education cannot be separated from sustainable education because the "*integration of environmental health, social equity and economic vitality in order to create thriving, healthy, diverse and resilient communities for this generation and generations to come (UCLA, nd)* is essential for our common future. From the sustainability viewpoint we know that these challenges are interconnected and require systems supported by a multilevel approach and an acknowledgment of complexity (Nicolescu, 1996). Last but not least, the importance of education for sustainable development in which attention is directed towards the



transformation of educational systems with focusing on innovative pedagogies, characterised by technology-driven, efficient, and intelligent learning environments, available to all with equity, equality and justice, has already been highlighted through updated documents (UNESCO, 2018). In this context, *smart educators* emerge a critical players and they will have a key role to play on the development of smart and sustainable education.

### 3.3.1. Smart Education in the Light of Knowledge and Wisdom

Part of the language of the information sciences, the DIKW model of the Pyramid of Knowledge or the Pyramid of Wisdom speaks of a continuous flow of transformations sustained for the increasingly complex organization of large disparate, meaningless databases into increasingly elaborate informational collections, with increasingly broad meanings, which will finally allow the prioritization of intelligent, profitable actions and which will open up new opportunities. According to Ackoff, the originator of the model, these steps are actually processes contents of the human mind/cognition (Rowley, 2007). DIKW is the acronym that captures the hierarchical steps of transformation starting from Data, passing through Information and Knowledge to Wisdom. The transition from the lower levels of the pyramid to the higher ones is supported by the increase in the degree of understanding of the meaning of the contents: the transition from Data to Information involves understanding the relationships between data or different forms of representation of reality, the transition from Information to Knowledge incorporates the understanding of patterns, in specific contexts, and the passage to Wisdom is achieved by understanding the general principles, beyond the contextual specificity. The implicit assumption is that, through a continuous abstraction, data contributes to the formation of information, information underlies knowledge, and knowledge supports the development of wisdom. We connect DIKW with the circular process of education, where learners take different roles as students, researchers and teachers that are critical in the knowledge development process.

This hierarchy proposed by the information sciences is equivalent to the bottom-up approach of information processing in the cognitive sciences. In the case of mental functioning, the ascending approach is completed with the descending one in which the higher levels of the hierarchy – thinking, already existing mental constructs, influence the informational input, in the language of information sciences, wisdom and knowledge lead us to collect those data that lead us to select specific information and data to support our use of knowledge and wisdom, as the review of the DIKW model shows (Tuomi, 2000). We have here a relationship of mental circularity: starting from a given objective reality, subjective mental constructions are created, more and more complex with more and more extensive meanings, this circularity of transformations leads to an increase in information and knowledge, an iterative and critical updating of both the theories and the necessary methodologies.

This approach in fact captures the pattern of an active transformative education - the assimilation of the data of the various studied subjects creates the domain-specific representations, representations that will receive increasingly abstract and complex meanings by including them in the already existing cognitive schemes, with applicability more and more extended and the transforming flow will be all the more intense the more nuanced the input and output will be.

A stimulating educational offer must intervene and create learning contexts for each level of the informational transformation. Some examples of favourable educational contexts, necessary for modern education can be found around the idea of transdisciplinarity that initiates from a larger base of alternative representations for the same data of reality but also contexts in which the formed representations acquire different meanings; where classic computer technologies are able to facilitate the acquisition of data (Sun, Liu, 2022). For example, data processing based on algorithms contribute to the generation of predictable information and knowledge, but the inclusion of frontier technologies in the university education process *"have the potential to disrupt the status quo, to change the way people live and work, to rearrange funds of value and lead to completely new products and services"* (Rebouillat, 2022).

Expanding the social context of learning - co-learning - by including partners with different levels of expertise - teachers, researchers or colleagues - can be applied to induce higher innovation performance and more efficient structures for the use of information resources for each of the learning participants (Alier, 2021). In this way, each member of the team "accesses" new data and new informational structures, shading his own "wisdom" and simultaneously plays the role of source and recipient of learning. As a result, educators should consider to which extent activities centered on learning, in modern society, characterized by exponential growth of information, require knowledge exchanges between members of an organization (classes, study groups, teachers - students - researchers alike). Further aspects to be considered relate to required IT resources, thus the inclusion of a correct knowledge management would combine the spirals of converting individual experiences into educational innovation and organizational knowledge in the higher education sector that ignite the transformation of the learning process (Fidalgo-Blanco et al., 2014). The synthesis of these important coordinates for the learning context and the transition to true e-learning practices requires a management of the associated infrastructures and processes to guarantee the ethical use of data in academic analysis and learning through correct technological decisions made by people and for people, to achieve a more inclusive, participatory and human university supported by technology and innovation (García-Peñalvo, 2021).

As a final example of a characteristic of a stimulating educational offer and an optimal learning context, from a pedagogical perspective it is necessary to establish, as an explicit educational goal, the realization of wise learning/learning for wisdom. In the information sciences wisdom is a very vaguely defined concept, despite the recognition of its value and its placement at the top of the pyramid of knowledge. It is synonymous with information synthesis and the extremely high level of abstraction manifested by intuition, understanding and complex interpretation of data and actions, by contextualizing events, etc. In other terms but with the same meaning, for psychology and education, wisdom is expressed as a form of knowledge, understanding and perspective, of reflective thinking and merging individual opinions and interests with the benefits and well-being of others, partially overlapped with intelligence and creativity (Kordnoghbi et al., 2017). The central core to be considered is how cognitive psychology distinguishes the definition of wisdom to include information processing and moral benchmarks of processing, wisdom being a combination of intelligence and morality in a mutually supportive whole (Fengyan et al., 2012). Through this perspective, wisdom could be conceived as *"a morally grounded application of*



*metacognition to reasoning and problem solving*" (Grossmann, 2020). Wisdom is a psychic structure rooted in the culture, experience and context of each person, but it is not reduced to the simple "living" of some experiences (input of data), but requires reflection on these experiences. Many scholarly studies speak of adverse life events as sources of wisdom; if they are taken only as experimentation they become traumas, sources of stress and disorganization (Dorfmann et al., 2021).

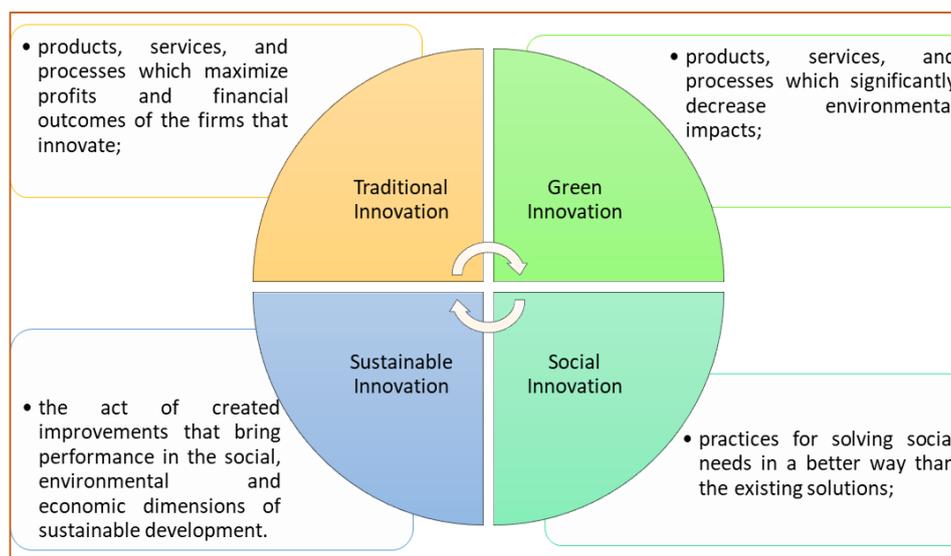
Converting experiences into wisdom calls for pragmatic thinking about social issues, conceptualizing the world as a place of flux and change, of diversity of viewpoints with the need to integrate them, self-decentring, self-reflection and creating opportunities for new insights. As a pedagogical derivation, the development of wisdom necessarily includes new experiences, difficulties, overcoming the limits of personal comfort, effort; learning itself is an energy-consuming activity and is irreducible to entertainment, leisure or simple informational "tanning." The meta-cognitions involved in the transfers to wisdom are, in turn, derived from the already crystallized personality structures: personal capacity for self-transcendence, the ability to consider different perspectives, the ability to seek deeper understandings/insights about self-seeking, deeper self-insight, (all leading to an intellectual humility) to express compassion/empathy, ability to manage uncertainties, but also humour, open mind, and tolerance (Huin et al., 2018) to mention just a few of the traits analyzed in specialized studies. Within our proposition for an educational model that supports EUT+, we envision a pedagogy that needs to be adapted to modern reality, that cannot exclude these purposes so necessary for the social adaptation of individuals, but must propose methods, strategies, concrete infrastructures for acquiring the skills necessary to achieve these purposes and that we are framing around technology and innovation as critical pillars of our circular pedagogy.

#### 4 Technology and Innovation

Globalization, intensified immigration, advancements in technologies and continuous innovations has increased the differentiation in today's societies, where teachers are playing a central role in maintaining the multicultural environment and managing its processes. Intercultural competence is considered to be crucial for HE graduates in a context of internationalization, because it helps them to fight prejudice, empowers them professionally and prepares them to live in a globalized world. Innovation, seen as a marketable practical application of an invention, an integration of the invention into economic and social practice offers opportunities for the students and teachers to develop intercultural competences. Constant learning and the acquisition of new pedagogical approaches relevant for teachers is critical, since society and students are changing entities with different cultural values and diverse backgrounds, making it necessary to develop appropriate skills that help them to evolve, grow and develop. However, to identify these new approaches it is important to understand the innovation process and the role of technology to enable and foster sustainable education. If we view invention as the act of imagining, inventing, creating something new, or the faculty of discovering something, or creating through imagination, innovation can be understood as the whole process that continues from the emergence of an idea to its materialisation, through research, prototype development and the first phases of production. Silvestre & Țîrcă (2019) approach innovations from the perspective of the organisation that adopts them to address economic, environmental and social needs that

would be met by recombining existing technologies and knowledge. The authors present four types of innovation as can be observed in figure one below.

Figure 01: The four types of innovation



Source: Adapted from Silvestre & Țîrcă (2019), and Kneipp, Gomes, & Bichueti (2019)

Numerous studies have investigated innovation in pedagogy. For example, Paniagua & Istance (2018) describe pedagogical innovation as a process of learning that requires from the teachers to:

- change their practices;
- play the roles of co-designers;
- use their own experiences as bases for implementation and innovation;
- work with computing technologies adopting, largely, student-centred pedagogies.
- be able to use digital technology to stimulate student learning (Sailer, Schultz-Pernice, & Fischer, 2021).

Innovation in pedagogy takes ideas and practices bringing them together in new ways to upgrade the interactions between students and teachers, between educational institutions and the economic, technological, and social development of society. It has to be open to interference and dynamic change. The development of new pedagogical models in a technological and sustainable environment such as circular pedagogy implies suggesting new practices that involve technology but do not exclude traditional ones. In the following paragraphs there are approaches of: i) the traditional teacher-centred, ii) the progressive student-centred, and iii) the critical pedagogy in a technological perspective, that are some of the innovative pedagogical models considered by the extant literature.

Nancy et al. (2020) address advanced teaching pedagogy as an innovative part of pedagogy that incorporates technology into teaching-learning methods with the aim of creating successful learning experiences for students using two educational models: face to face learning and hybrid learning. In addition to the two educational models, online learning



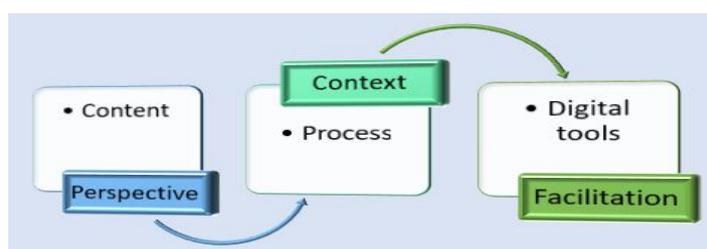
uses technology to simulate or enhance traditional teaching methods and to form online communities, which is a huge benefit of learning. E-learning as a form of technological development has become an emerging opportunity to enhance the value of learning in this disruptive era. This is linked to the strategy of the paradigm shift in higher education, which is expected to move from: i) acquiring competences to gaining competences and ii) monodisciplinary learning to interdisciplinary, multidisciplinary and transdisciplinary learning. Through this educational model, students can interact with each other to support their studies, experience the power of social learning and be inspired by an international network of learners, to share their ideas with classmates and teachers at every stage of their learning process.

Starting from collaborative learning (CL) which is a pedagogical model that improves students' social and academic learning (Liebech-Lien, 2021), through the fusing of CL with technology is developed the computer-supported collaborative learning which implies technologies in order to facilitate collaboration among learners using different approaches that Saqr, Elmoazen, Tedre, & Hirsto (2022) summarise as:

- face-to-face educational model;
- tablets or smartphones as didactic means;
- synchronous interactions among collaborators through instant messaging or asynchronous interactions through exchanging messages.

Taimur & Onuki (2022) consider that higher sustainability education plays an important role in transformative learning through allowing students to develop their critical thinking. Introducing technology in the transformative learning environment, the authors approach the digital transformative pedagogy (DTP) as "*transformative pedagogy in digital settings*" in which it can be developed a favourable environment for creative and transformative learning using technologies. DTP is compound from six components as can be observed in figure two below.

Figure 02: The components of the Digital Transformative Pedagogy



Source: Aadapted from Taimur & Onuki (2022)

Suppose the course content is structured around sustainability issues through the lenses of Digital Transformative Pedagogy and with the support of our Circular Pedagogy. In order to deliver insights and beliefs for learners, skills and values to address challenges associated with sustainable development and education, there is a need for a context that integrates digital facilities and tools to explore their suitability and their value as we transition towards smart education that foster sustainability. In that case, the Perspective element provides learners with diverse insights in order to enable them to think critically, develop

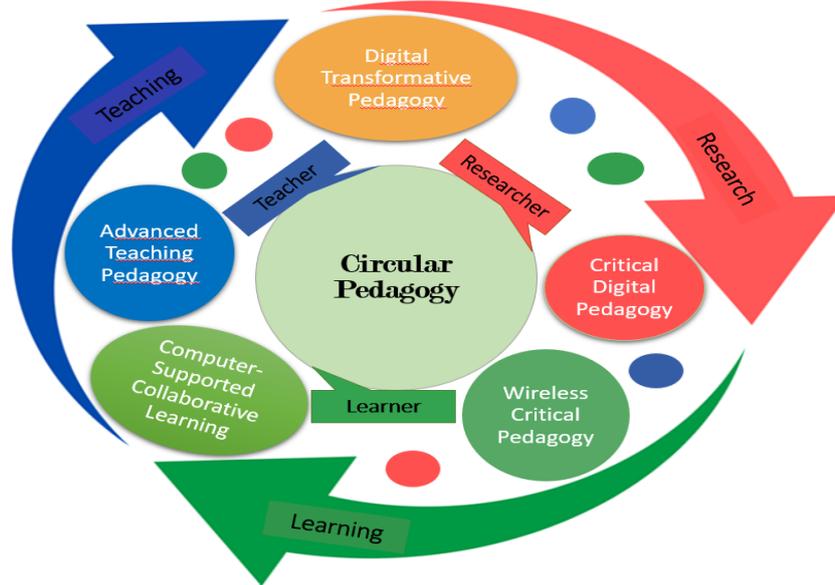


relationships, practices and paradigms to ensure a holistic comprehension of the sustainability matter and its complexities. The Process is connected to the Context offering opportunities for learners' active participation in lifelong learning by engaging them in creative thinking and problem-solving by encouraging them to adopt a sustainability theme. In this way, the context builds the learning environment to bridge the gap between the digital world and the real world and to offer learners the possibility to frame a sustainability challenge in a particular geographical place to formulate solution ideas for the framed challenge. The Digital tools are the essential component of DTP to put transformative learning into practice being represented by technological tools for creating an authentic learning context through the realistic presentation (images, sounds and animations) of the learning scenario. At last, the Facilitation stage allows educators to disseminate knowledge using appropriate communication technologies aiming to bridge the gap between the real and virtual worlds that materialise in a sustainable learning environment where learners take interchangeable roles as students, teachers and researchers.

Alongside the models presented above, in order to build a solid base for the circular pedagogy model from the perspective of circularity between innovation, educational agents represented by students, teacher and researchers and educational processes of learning, teaching and research, there are more models in the literature that can assure consistency as for example, the Critical Digital Pedagogy, a "*translation of Critical Pedagogy into cyberspace*" in which students and teachers will be critical co-inquirers of knowledge (Masood & Haque, 2021) and Wireless Critical Pedagogy, whose framework points to innovative ways of using mobile devices to develop critical consciousness for and besides the academic purposes met in the classroom (Garcia, 2020). Within this last type of Critical Pedagogy, the author considers that using mobile devices as means that offer a pragmatic way for differentiation and socialisation, students share their work with each other and with their teacher, all of whom can create content, pose questions, provide feedback, suggestions, and critiques.

In figure 03 below we can observe the representation of our novel circular pedagogy within: i) the digital pedagogies models presented above as part of the circularity, ii) the student, teacher and researcher playing their interchangeable roles and iii) learning, teaching and research as continuum educational transformative acts where the integration of technology and innovation bring us closer to the concept of smart education.

Figure 03: Circular pedagogy within the technological education context



Source: Authors (2022)

These innovative digital pedagogies in collaboration with our circular pedagogy will contribute to help and support smart educators not only to facilitate multicultural ideals of inclusive, interactive, and collaborative activities, but also to perceive the world better, think critically and perform decisively offering powerful tools, which constructs flexible contents to generate cogent online possibilities related to multicultural contexts. Technology can provide creative spaces for student-teacher-researcher, interactions that not only promote communication and free exchange of knowledge that boost the sustainable environment for learning-teaching-research, but also inspire innovation and change. Building on the main objective of developing students' critical and reflective skills by encouraging collaboration even crossing cultural and political boundaries, technology, through e-space by: i) the means by which both synchronous and asynchronous dialogues can be encouraged and ii) the engine that make functional the circularity of the learning process.

## 5 Smart Education for Sustainable Development

In 2015 the United Nations introduced the 2030 Agenda as a framework that built and progressed on the Millennium Development Goals that were established in 2000, and that was framed around eight goals. The new working framework offers guidelines to encourage and promote sustainable development, culminating in identifying the 17 sustainable development goals and its ambitious 169 targets to be achieved by 2030. Unfortunately, despite the provided framework and the call for the urgent need for action, the world and, in particular, the educational system have not managed to commit to the serious implementation of the agenda. The UN member states have failed to coordinate and develop a collaborative framework of action. In most cases, the approach has been focused on states prioritising the SDGs according to their national action plans. As a result, the global



dimension of the 2030 Agenda has been lost putting into jeopardy the intention of meeting the SDGs by the 2030 deadline.

According to Findler et al. (2019), the educational system can play a critical role in promoting, articulating, and supporting the development of skills and competencies that contribute to our social understanding of the urgency to work and build strong foundations that enable us to progress towards a sustainable future for all. However, there are significant challenges and barriers regarding the implementation of an educational system that *"leave no one behind"* (UN, 2015). The HE community faces significant challenges in terms of being significantly under-resourced and affected by a lack of leadership for action and impact. Furthermore, national and international educational systems have been forced to adopt a fierce competitive working model in alignment with the characteristics that define the business environment. HEIs need to compete for students and research funds that undoubtedly question the UN SDG 4 and its vision of *"ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all."* Education is indeed the basic building block of every society that according to Article 26 of the 1948 Universal Declaration of Human Rights states *"Everyone has the right to education"* (UN, 1948). There is no doubt that HEIs are identified as critical actors in driving sustainable development as through their teaching and research activities they can help in providing clear guidelines focused on sustainability goals. They are vital in contributing to our better understanding of the challenges associated with sustainable development and providing informed teaching and research spaces that enable engagement between different stakeholders that work together to drive impact and change. Our global society urgently needs a profound socio-economic and environmental transformation, and we argue that the educational system should be able to take a more prominent role in driving the required changes (Corcoran et al., 2021; Mulder, 2010; Fien, 2002). However, to make change that leads towards positive impact, there is a need to acknowledge cultural differences and problems associated with a failure of multiculturalism policy and derived challenges regarding diversity and inclusion across the EU. Undoubtedly HEIs do need to play a role by enabling the development of intercultural competencies if we seek to address the existing policy failure. We live in a global society that is very diverse, and we need to learn to work together so that we can build a better future for all; and unquestionably, education is a critical pillar to help us to develop the necessary skills and competencies that empower us to function as responsible global citizens.

A brief overview of the history of the UN-related HE movement towards addressing sustainability and its role in the international sustainability discussion reveals a worrying lack of coordination, collaboration, and participation. In addition, significant concerns arise as we turn our eyes towards educational models and their sustainability as governments are reducing their financial support to educational systems and increasing their pressure to move towards self-funded and financially autonomous institutions. At the time, there are significant demands seeking HEIs that are more competitive and that move away from the need to consider integrated educational models that seek to provide high-quality education based on collaboration, participation, and knowledge sharing. The situation becomes even more complex as we consider the internal functioning of universities, where the role of teaching, learning and research activities are frequently disassociated leading towards a toxic culture where research takes a more prominent role than teaching and learning



activities. The outcome is significant damage to offering high-quality education and learning environments that are well-informed and guided by sound scientific contributions developed within a transdisciplinary working and learning environment. The isolation and silo approach affecting different disciplines is a major area of concern, as our contemporary world is facing global challenges that demand innovation, creativity, critical thinking, and new ways of working that cannot be achieved if we keep working within the restrictive discipline-specific domain or the no sufficient cross-disciplinary or interdisciplinary approach. Furthermore, there seems to be an apparent conflict between governments' educational agendas and the guidelines provided by UNESCO (2020a) that underlines the need to accelerate engagement and collaboration between different HE institutions and entities (Weiss and Barth, 2019). For example, educational programmes and research activities are being used as a way to move up in the international rankings, but without having a major impact on societal changes that materialise of specific actions that support the development of active networks that promote sustainability goals.

In the early 2000s, there was a significant shift in our understanding of education and how it can promote sustainable development, as the UNESCO (2005c) introduced new guidelines seeking to highlight the role of HE in influencing and shaping our societies. However, the guidelines did not seem to provide sufficient support to integrate changes in existing educational models that enable academics, researchers and students to work together across different disciplines so that we can expand our understanding and knowledge of sustainability challenges and be more proactive in our responses (Kohl et al., 2022). The lack of government supports to reconduct the educational system, and the inappropriate implementation of policy guidelines has led towards a situation where HEIs are keen to have sustainability embedded as part of their image and window dressing approach, with a stark reality revealing the lack of significant change or impact. There is a lack of acknowledgement of critical challenges associated with learning environments that are aware of cultural differences and that aim to readdress policy problems identified in the context of multiculturalism (UNESCO, 2007). Furthermore, it is not very clear in which way HEIs are providing educational models that bring together sustainability principles within a multicultural and multidimensional context. There is a need to reconsider in which way HEIs can be empowered and supported to make a more active contribution towards driving the sustainability debate and, more specifically, to drive much-needed change and actions. HEIs working, learning, and research environments need to be guided by knowledge sharing grounded on exchanging good practices in international teaching, learning and research activities that will help us to move ahead with the challenges associated with sustainable development. In alignment with Mulder (2010), HEIs *"should not preach; they should practice."* The academic and research community must be able to develop and implement a way of working in alignment with UNESCO guidelines for sustainable development (UNESCO, 2014), where students, teachers, researchers and relevant stakeholders work together to build and nurture skills and competencies needed so that we can live what we learn. We should be able to use gained knowledge to drive action that leads to meaningful change and positive impact on the way that we live and interact in our global society.

## 6 Conclusions

Although the EU has designed and implemented numerous relevant policies and projects, the results seem to have done little to stem rising levels of social conflict between immigrant groups and dominant populations. An important element to consider is the need to re-examine educational models and how they could be used as an effective policy-making tool that leads the transformation process towards European educational models that are move inclusive. European HEIs must reconsider their educational models and question their ability to prepare current and future generations to live in a global society that embraces sustainable development. We argue that a circular pedagogy for sustainable education can bring needed changes in the educational systems that should be supported by smart and inclusive education. Undoubtedly, the task is daunting, but the consequences of neglecting the need for change and transformation are enormous. Our future, the future of our children and future generations is at stake, and education emerges as the key to help us shaping societies that are able to co-exist and work together with a united front from sustainable development.

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- <https://unesdoc.unesco.org/ark:/48223/pf0000265773>
- [http://uis.unesco.org/sites/default/files/documents/education-2030-incheon-framework-for-action-implementation-of-sdg4-2016-en\\_2.pdf](http://uis.unesco.org/sites/default/files/documents/education-2030-incheon-framework-for-action-implementation-of-sdg4-2016-en_2.pdf)
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